Project Profile

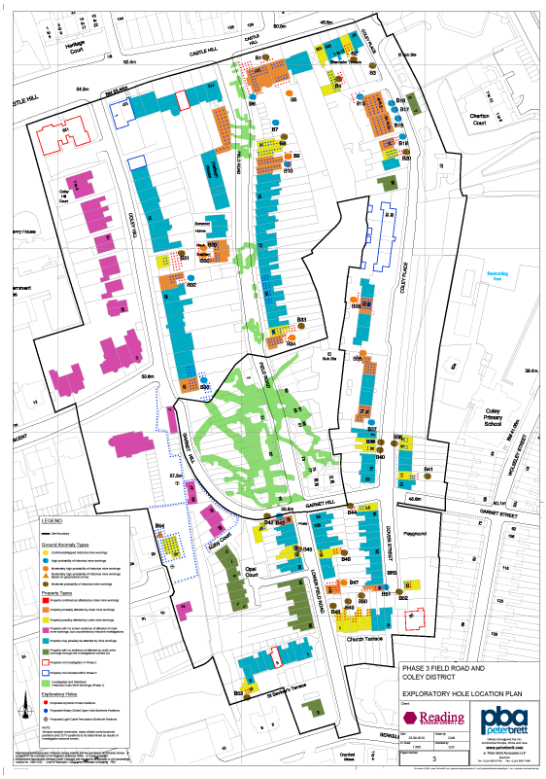
Forkers Ltd

Field Road/Coley District: Phase 3 Chalk Mine Ground Investigation and Ground Stabilisation Scheme

Client: Reading Borough Council
Designer: Peter Brett Associates (PBA)
Project Manager: SLR Consulting
Value: £3.3m
Date: Jan – Dec 2011

Old chalk mine workings were found to exist in this mainly residential area of Reading following a large collapse in Field Road in Jan 2000. At that time an emergency stabilisation contract was undertaken to treat workings found locally to the area of subsidence. In 2005 funding was secured to undertake further site investigation to a wider area which proved that the extent of old mine workings was much more widespread than first thought. This contract was the third phase of the programme of work that aimed to follow up on the phase 2 investigations by completing a more detailed investigation followed by stabilisation of around 53 properties thought to be affected by the mine workings blight. The work was funded by cash from the Land Stabilisation Programme of the Department of Communities and Local Government.

Interpretation of data from the previous investigations had identified at least 17 areas of workings and a priority investigation and treatment sequence was allocated by PBA to groups of properties or individual houses for this scheme. This drawing shows the location of investigation holes, and the results from these holes were analysed to enable design of the stabilisation solution which is bespoke to each property.



The properties in the area range from a small number of industrial premises and offices, large detached Victorian properties and terraces to more modern town houses and flats and there was a significant challenge in terms of gaining access to both the front and rear of properties for drilling rigs and ancillary equipment in order to complete both the investigation drilling and treatment work. In some locations we had to crane rigs over houses and walls or into gardens and also to use scaffolded working platforms.

Investigation work consisted mainly of dynamic probing and rotary probing with down hole camera and laser surveys being carried out where significant voids were found. In total 1187 investigation holes were drilled.

We used inclined drilling techniques for much of the drilling under the properties so we could carry out the work from roads, gardens and courtyards around the buildings, rather than carry out any of the work from inside properties which would have been immensely disruptive, and we used several rig types to ensure we could cope with the varied access restrictions.

Drilling rigs used in the investigation phase included Klemm KR904 geotechnical rigs, Klemm KR701 and Krupp 30G Mini rigs as well as Terrier dynamic probe rigs.

Civil & Ground Engineering Contractors

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During rotary investigation drilling various parameters were recorded including rotation speeds, air pressures, penetration rates and flush returns which gave Peter Brett engineers a clear indication of ground conditions and the presence of mining anomalies.

The investigations revealed 20 mine workings which were treated by either infilling the larger voids with a 5:1 PFA/ cement infill grout or stabilising macro voided, loosely infilled or collapsed areas using compaction grouting techniques. Here a 6:2:1:0.1 mix of sand, PFA, cement and bentonite was injected using an 'end of casing' injection method, 101/139mm diameter rotary/rotary percussive steel casing was drilled to the full hole depth and then used as the grout injection tube, the casing was withdrawn in stages thus allowing complete control and monitoring of grout volumes and pressures. 1700 tonnes of grout was injected during the treatment phase.

555 treatment holes were drilled predominantly by angled drilling to target treatment of the property footprints. Drilling rigs used during the treatment phase included Klemm KR904 and Casagrande C6S geotechnical drill rigs, Klemm KR701 and Krupp 30G Mini rigs.

During the investigation and stabilisation work continuous monitoring of properties was carried out using laser levelling, precise levelling, EDM surveys, crack monitoring 'tell tales' and physical condition surveys.

The interface with residents and the community was inevitably going to be very high and we identified in our tender submission that residents liaison would be approached by allocating a full time site liaison officer to the contract. Cooperation from the community was essential and continuous communication with the residents ensured that discussions were held and proposals agreed with each resident well in advance of our need to enter any property and that any problems or concerns were quickly resolved. We also took part in a well attended open day at the local school which included displaying 2 drilling rigs that we would be using on the contract.

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